

Categorization and Intensity of Chinese Emotion Words

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Abstract. Despite the increasing interest in studying Chinese emotion words, there has been no reliable references in the published literature on the category (e.g. *happiness*, *anger*) and intensity (e.g. low, high) of emotion words in Chinese as perceived by native speakers. This study is the first to collect and analyze average language users' perception of emotion category and intensity of Chinese emotion words. Results of this study will serve as an important reference for future research on language and emotion.

Keywords: Chinese emotion words, emotion category, emotion intensity

1 Introduction

In recent years, the research on Chinese emotion words and expressions has enjoyed increasingly high popularity and wide application in the fields of both linguistics and artificial intelligence (especially in automatic sentiment analysis; see [1], [2], among others). However, a fundamental problem in this line of research is the lack of reliable, widely-accepted ratings of emotion category (e.g. *happiness*, *anger*) and emotion intensity (e.g. low, high) for Chinese emotion words. Existing studies computed the measures either from a few researchers' judgment or automatic computation ([3], [4], [5], [6]), neither of which can accurately represent the perception of average language users (cf. [5], [7], [8]). This study aims to fill the gap by collecting laymen's ratings of emotion category and intensity of Chinese emotion words from a large-scale online survey. In the current paper, we report results of the first stage of the study.

2 Data and Procedure

Design of the current study mainly follows Strauss and Allen's [8] survey of English emotion words.

2.1 Data and Design

A total of 374 Chinese emotion words are taken from Xu and Tao ([4], cf. [6], [8])³ and randomly divided into four word lists. To control for rating reliability, each list also includes two or three words repeated within the list, two words repeated across all the lists and one pseudoword (几几), resulting in 98 items on each list. Table 1 shows all the repeated items within or across the lists.

厌倦, 悲痛	Repeated within list 1
担忧, 丧气	Repeated within list 2
惊惧, 惊喜	Repeated within list 3
愤慨, 愁闷, 惦念	Repeated within list 4
开心, 愤怒	Repeated across all lists
几几	Made-up word across all lists

Table 1. Repeated items for testing rating reliability

2.2 Participants and Procedure

Participants are 92 native Chinese speakers (mostly university students) from Mainland China. Each participant is randomly assigned to work on one word list administered on the Google Form platform. For each test item, the participant's task is to choose the most appropriate emotion category from seven basic emotion categories ([8], [4], [6]): *happiness* (喜), *sadness* (哀), *anger* (怒), *fear* (惧), *surprise* (惊), *anxiety* (焦虑), *disgust* (厌恶). If none of the basic emotion categories is appropriate, the participant may choose from the other three options: *other emotions* (其他情感类型), *neutral/emotionless* (中立/无情感色彩), and *unfamiliar with the word* (不理解词义). If the word is recognized as a true emotion word (i.e. one of the seven basic categories or other emotions), the participant also needs to rate its emotion intensity on a 7-point scale (1=basically no emotion; 7=very strong emotion).

It should be noted that the 374 test words not only cover typical emotion words (e.g., 开心, 愤怒) but also words whose emotional content is arguable (e.g., 对不住, 痒痒; cf. [6]). Furthermore, the test materials also include words that are less commonly used or only used in certain dialectal regions (e.g., 背悔, 来劲). Thus, it is up to the participants to decide whether or not the test words are truly emotion words. The participants can choose *neutral/emotionless* (中立/无情感色彩) if they think a certain test word does not express any emotion, or *unfamiliar with the word* (不理解词义) if they do not understand the meaning of a test word.

The number of participants assigned to work on each word list is given in Table 2. On average, each word is rated by 21.1 participants (s.d. = 3.3).

³ Xu and Tao's (2003) list has 390 words in total. Our study excludes 16 monosyllabic words that are listed as category names in Xu and Tao ([4]), e.g., 喜 and 悲.

Word list	Number of participants
List 1	27
List 2	22
List 3	21
List 4	22

Table 2. Number of participants for each list

3 Results

3.1 Reliability

Rating reliability within the rater is measured by the rating consistency of words repeated within the word list. For each intra-list word ($n = 9$), we first calculate the percentage of participants that rate the two occurrences of the word with the same category. On average, each item is rated consistently by 75% of the participants (range: 55% - 100%). Furthermore, correlation tests show that six out of the nine intra-list repetition items have consistent intensity ratings (correlation coefficient > 0.5) between the two occurrences and these six items cover all four lists (see Table 3). Taken together, these results indicate that the participants are in general quite consistent when rating emotional category and intensity.

Word repeated twice within a list		Correlation coefficient
List 1	厌倦	0.12
	悲痛	0.82
List 2	担忧	0.78
	丧气	0.57
List 3	惊喜	0.40
	惊惧	0.62
List 4	愁闷	0.74
	愤慨	0.62
	惦念	0.41

Table 3. Correlation coefficient of the intensity ratings of items repeated within lists

The second type of rating reliability is the consistency across raters. Since each participant only works on one word list, word items repeated across lists (开心, 愤怒) are used to gauge rating consistency across different rater groups. All four groups of participants unanimously ($>85\%$) categorized 开心 and 愤怒 as words of *happiness* and *anger*, respectively. Furthermore, T-test results show that the intensity ratings of 愤怒 did not vary significantly across lists (all $p > 0.05$). Cross-list differences did exist in intensity ratings of 开心, but the range of variation was small (between 4.3 and 5.5 on the 7-point scale) and in

all four lists, 开心 was recognized as a high-intensity emotion word (see section 3.2 for the classification of emotion intensity). The repeated pseudoword, 几几, is recognized most often as *unfamiliar* across groups (48.2 - 68.2%), followed by *neutral/emotionless* (13.6 - 22.2%). Altogether these two categories accounted for more than 70% of the ratings in all four groups. Compared with the English study, the Chinese pseudoword was less reliably recognized as a non-word (i.e. unfamiliar), probably because the Chinese pseudoword 几几 is associated with real words such as 磨磨叽叽 and 叽叽喳喳 by the participants.

3.2 Categorization and Intensity Results

For each test word, we calculate the emotion categories with the highest and second highest percentage of raters as the primary and secondary emotion categories. Following Strauss and Allen [8], we divide the test words into two groups: *representative* emotion words and *blended* emotion words. Representative emotion words are defined as those whose primary emotion category is agreed by more than 70% of the raters and therefore can be considered as highly representative of the primary category, e.g., 开心 (*happiness* by 100%) and 厌倦 (*disgust* by 96.3%, *sadness* by 3.7%). Blended emotion words are those whose primary category is voted by no more than 70% of the voters and therefore express a mixture of more than one emotion type, e.g., 狂乱 (the two most-often-rated categories are *other emotions* by 31.82% and *anxiety* by 22.73%) and 懊恼 (the two most-often-rated categories are *anger* by 33.33% and *sadness* by 29.63%).

Raw intensity ratings for true emotion words (i.e. primary category is one of the seven basic emotion types or other emotions) are averaged across all raters and then broadly classified as *high* (average intensity rating > 4) and *low* (average intensity < 4). By using a less fine-grained intensity scale, we reduce potential problems associated with within- and inter-rater inconsistencies. Category and intensity information of all the representative emotion words ($n = 139$) is listed in the Appendix.

4 Discussion

4.1 Findings of the current study

As discussed above, current results from the survey generate a list of words that are highly representative of each emotion category (see Appendix for more). Table 4 below further presents a list of words that are unanimously voted (100%) into one emotion category and thus can be considered as core members of the category.

The results of this study also suggest that words with lower intensity tend to be *blended* with multiple emotions. As shown in Table 5 below, emotion words with high intensity have roughly equal chances to be representative of an emotion category or blended. However, when emotion intensity is low, the odds of being *representative* against *blended* is even lower than 1:4.

Category	Words voted by all participants into the category
<i>disgust</i>	腻烦, 讨厌
<i>sadness</i>	哀伤, 悲伤, 悲恻
<i>happiness</i>	赞赏, 欢乐, 欢欣, 乐意, 快乐, 愉悦, 喜悦, 欢娱, 欢快, 欢愉, 高兴, 惊喜, 欣喜, 喜欢, 欢
<i>anger</i>	愤怒, 忿怒, 暴怒
<i>surprise</i>	诧异, 吃惊, 惊疑, 惊愕, 震惊
<i>fear, anxiety, neutral, unfamiliar</i>	NA

Table 4. Highly representative emotion words

	High intensity	Low intensity
Representative	118	21
Blended	116	88

Table 5. Counts of representative and blended emotion words in different intensity conditions

This study also finds six words that are rated as other emotions by more than 70% of the participants: 怜惜 (86.36%), 吝惜 (80.95%), 惭愧 (74.07%), 羞涩 (71.43%), 激昂 (71.43%), 羞怯 (70.37%). These ratings indicate that the seven emotions of this study (*happiness* 喜, *sadness* 哀, *anger* 怒, *fear* 惧, *surprise* 惊, *anxiety* 焦虑, *disgust* 厌恶) may not be sufficient to categorize emotions, and thus serve as a reference for the long-debated question regarding what emotion is primary or basic (cf. 24 categories in Xu and Tao [4], five in Lee [6], and six in Turner [9], [10]).

4.2 Comparison with previous studies

Among others, Lee [6] also publishes a Chinese emotion word list, divided into five basic emotions (*happiness*, *sadness*, *anger*, *fear*, and *surprise*) and complex emotions as well as three intensity categories (high, moderate, and low). The emotion words in Lee [6] also come from Xu and Tao [4]. However, the categorization of emotion type and intensity in Lee [6] mainly followed Turner’s ([11]) emotion classification model for English by mapping Chinese emotion words to the English emotion taxonomy. There are two potential problems with this approach. First, it can be hard (if not impossible) to find precise equivalents of emotion words across languages; second, even if cross-language mapping based on lexical meaning can be established, the corresponding words may carry different emotional connotation, resulting in nuanced differences in the perception of emotional content by language users. When compared with the word list in Lee [6], the current study reveals both similarity and significant differences. Take words of happiness in Lee [6] as an example. Lee [6] lists 37 emotion words in the *happiness* category, among which four are labeled as low intensity, four as high intensity and 29 as moderate intensity. Our results show that while the majority

of these words are indeed categorized as representative of *happiness* (i.e. agreed by more than 70% of the raters) in our study, nine items fall into the *blended* category. Furthermore, four items are rated as *happiness* by less than half of the raters: 怡和 (27.27%), 晓畅 (36.36%), 闲适 (40.91%), 放松 (45.45%). More differences are revealed when comparing intensity classification. While the words labeled as low-intensity in Lee [6] do receive a low average rating of 2.98 in our study, the high- and moderate-intensity items were rated with 4.78 and 4.72, respectively. A follow-up T-test revealed that the high- and moderate-intensity items are rated with similar intensity in our study ($p > 0.1$). In other words, the high- and moderate-intensity items in Lee's study are shown to be very similar in intensity in our study.

5 Conclusion and Future Studies

To summarize, we report the first study to collect and analyze laymen's ratings of emotion category and emotion intensity of Chinese emotion words. Results of this study will serve as an important reference for future research on language and emotion, for instance, the possible relations among emotion category, emotion intensity, and the tones of the Chinese emotion words ([12]).

In the next stage of the study, we will recruit more participants and also take into consideration factors that may affect perception of emotion words, including gender, age, and region (Mainland China, Hong Kong, and Singapore).

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Appendix: Emotion intensity and category of representative emotion words

Word	N (# of raters)	Intensity (broad)	Primary Category	Secondary category
乐意	27	High	喜	—
乐	27	High	喜	—
喜悦	22	High	喜	—
喜欢	27	High	喜	—
开心	27	High	喜	—
快乐	22	High	喜	—
惊喜	21	High	喜	—
愉悦	21	High	喜	—
欢乐	21	High	喜	—
欢娱	27	High	喜	—
欢快	21	High	喜	—
欢愉	21	High	喜	—
欢欣	21	High	喜	—
欢	27	High	喜	—
欣喜	21	High	喜	—
高兴	22	High	喜	—
热爱	27	High	喜	其他情感类型
爽心	26	High	喜	不理解词义
兴奋	22	High	喜	其他情感类型
欢喜	20	High	喜	焦虑
欢悦	21	High	喜	惊
喜爱	21	High	喜	—
得意	21	High	喜	其他情感类型
畅快	26	High	喜	其他情感类型
幸福	20	High	喜	中立
快慰	20	High	喜	不理解词义
自豪	22	High	喜	中立
欢畅	22	High	喜	其他情感类型
满意	21	High	喜	中立
顺心	27	High	喜	其他情感类型

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Table 6 – continued from previous page

Word	N (# of raters)	Intensity (broad)	Primary Category	Secondary category
舒畅	21	High	喜	其他情感类型
珍视	26	High	喜	其他情感类型
痛快	21	High	喜	其他情感类型
得志	27	High	喜	其他情感类型
舒坦	27	High	喜	其他情感类型
舒服	26	High	喜	其他情感类型
快活	22	High	喜	其他情感类型
来劲	22	High	喜	中立
赏识	21	High	喜	其他情感类型
推崇	25	High	喜	其他情感类型
景慕	24	High	喜	其他情感类型
珍爱	27	High	喜	其他情感类型
钟爱	21	High	喜	其他情感类型
亢奋	25	High	喜	其他情感类型
赞赏	18	Low	喜	–
舒心	21	Low	喜	其他情感类型
可心	19	Low	喜	不理解词义
喜欢	21	Low	喜	中立
欣慰	20	Low	喜	其他情感类型
可意	26	Low	喜	不理解词义
称意	18	Low	喜	中立
称心	20	Low	喜	其他情感类型
忿怒	27	High	怒	–
暴怒	21	High	怒	–
愤懑	21	High	怒	厌恶
生气	22	High	怒	厌恶
激愤	26	High	怒	其他情感类型
愤怒	24	High	怒	厌恶
愤慨	22	High	怒	其他情感类型
忿恨	21	High	怒	厌恶
窝火	27	Low	怒	焦虑
吃惊	21	High	惊	–
惊愕	21	High	惊	–
惊疑	26	High	惊	–
震惊	20	High	惊	–
惊讶	21	High	惊	哀
愕然	27	High	惊	其他情感类型
惊骇	21	High	惊	不理解词义
惊诧	21	High	惊	惧
惊惶	27	High	惊	焦虑

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Word	N (# of raters)	Intensity (broad)	Primary Category	Secondary category
惊奇	20	High	惊	其他情感类型
惊慌	20	High	惊	惧
诧异	25	Low	惊	–
畏惧	22	High	惧	其他情感类型
恐惧	22	High	惧	惊
怕	27	High	惧	其他情感类型
畏怯	27	High	惧	其他情感类型
害怕	21	High	惧	惊
焦急	27	High	焦虑	其他情感类型
焦虑	22	High	焦虑	惧
心焦	21	High	焦虑	其他情感类型
焦炙	26	High	焦虑	不理解词义
着急	21	High	焦虑	惊
忧虑	19	High	焦虑	哀
焦躁	26	High	焦虑	其他情感类型
心急	21	High	焦虑	其他情感类型
烦躁	21	High	焦虑	厌恶
担忧	20	High	焦虑	惊
烦躁	20	High	焦虑	其他情感类型
担忧	20	High	焦虑	惊
烦躁	20	High	焦虑	其他情感类型
烦	21	High	焦虑	厌恶
发愁	20	High	焦虑	哀
不安	21	Low	焦虑	惧
烦恼	22	Low	焦虑	其他情感类型
烦闷	20	Low	焦虑	厌恶
挂虑	19	Low	焦虑	其他情感类型
烦心	27	Low	焦虑	厌恶
腻烦	27	High	厌恶	–
讨厌	27	High	厌恶	–
厌恶	21	High	厌恶	哀
厌烦	22	High	厌恶	焦虑
反感	22	High	厌恶	焦虑
鄙视	21	High	厌恶	哀
厌倦	27	High	厌恶	哀
鄙薄	25	High	厌恶	其他情感类型
憎恶	21	High	厌恶	怒
蔑视	27	High	厌恶	其他情感类型
轻蔑	21	High	厌恶	其他情感类型
鄙夷	25	High	厌恶	其他情感类型

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Word	N (# of raters)	Intensity (broad)	Primary Category	Secondary category
瞧不起	21	High	厌恶	中立
敌视	22	High	厌恶	怒
哀伤	27	High	哀	–
悲伤	27	High	哀	–
悲恸	22	High	哀	–
哀痛	21	High	哀	–
悲哀	22	High	哀	其他情感类型
伤心	27	High	哀	厌恶
哀愁	26	High	哀	怒
悲怆	20	High	哀	不理解词义
沉痛	21	High	哀	中立
苍凉	21	High	哀	中立
哀怨	21	High	哀	厌恶
悲痛	26	High	哀	厌恶
悲切	20	High	哀	其他情感类型
伤感	20	High	哀	中立
哀戚	20	High	哀	不理解词义
悲凄	20	High	哀	其他情感类型
悲凉	21	High	哀	其他情感类型
沮丧	22	High	哀	焦虑
心酸	21	High	哀	其他情感类型
悲壮	20	High	哀	其他情感类型
绝望	21	High	哀	焦虑
感伤	22	Low	哀	其他情感类型
遗憾	21	Low	哀	其他情感类型
惭愧	26	High	其他情感类型	哀
激昂	19	High	其他情感类型	喜
怜惜	20	Low	其他情感类型	中立
吝惜	18	Low	其他情感类型	中立
羞涩	17	Low	其他情感类型	中立
羞怯	23	Low	其他情感类型	中立

Table 6: Emotion intensity and category of representative emotion words